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(71) Applicant(s)

Robert Bosch GmbH

(Incorporated in the Federal Republic of Germany)

STUTTGART, Federal Republic of Germany

(72) Inventor(s)

Joachim Zimmer

Harald Rapp

Frank Katzenmeier

(74) Agent and/or Address for Service

Dr Walther Wolff & Co

6 Buckingham Gate, LONDON, SW1E 6JP,

United Kingdom

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(56) Documents Cited

EP 0537059 A1 WO 96/22204 A1 WO 96/11824 A1

US 4843898 A US 4683605 A

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(54) Mountings for wiper arms

(57) A wiper device, in particular for the wiping of panes at motor vehicles, comprising a coupling element (12) which carries a wiper arm and which can be set into reciprocating pivotal movement by means of a drive element (18) and a control element, the coupling element (12) being connected with each of the drive element (18) and the control element by way of a respective bearing (30) to be movable rotationally. The drive element (18) and the control element each have, in the region of the bearing, a respective recess (44) into which the bearing engages at least partially, thereby to increase the effective axial length of the bearing. The bearing can be formed by a pin (74) journaled in a bearing bush (60), which is located in a passage (58) in an enlarged end portion (54) of the coupling element (12), and in an opening (50) in the recess (44) of the drive element or control element. The bearing can be covered by a cap 94.

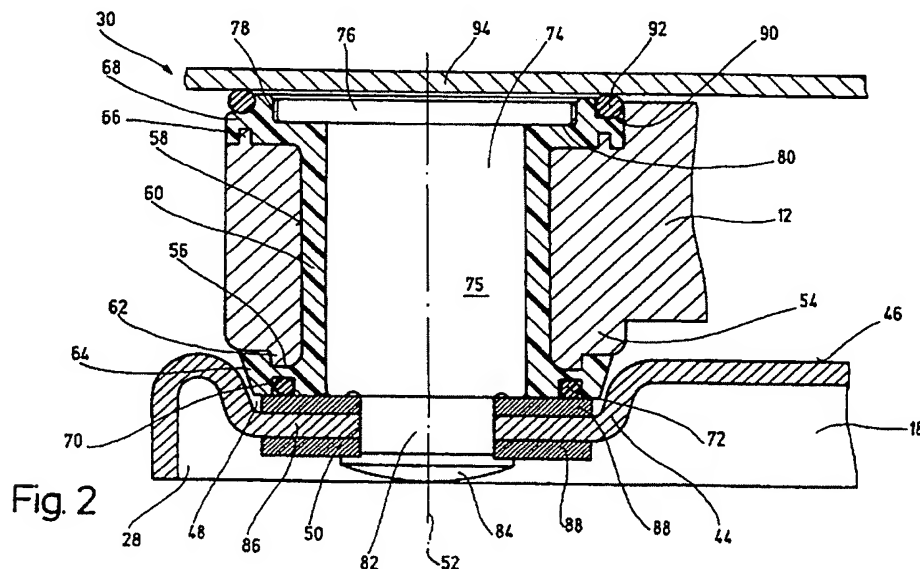


Fig. 2

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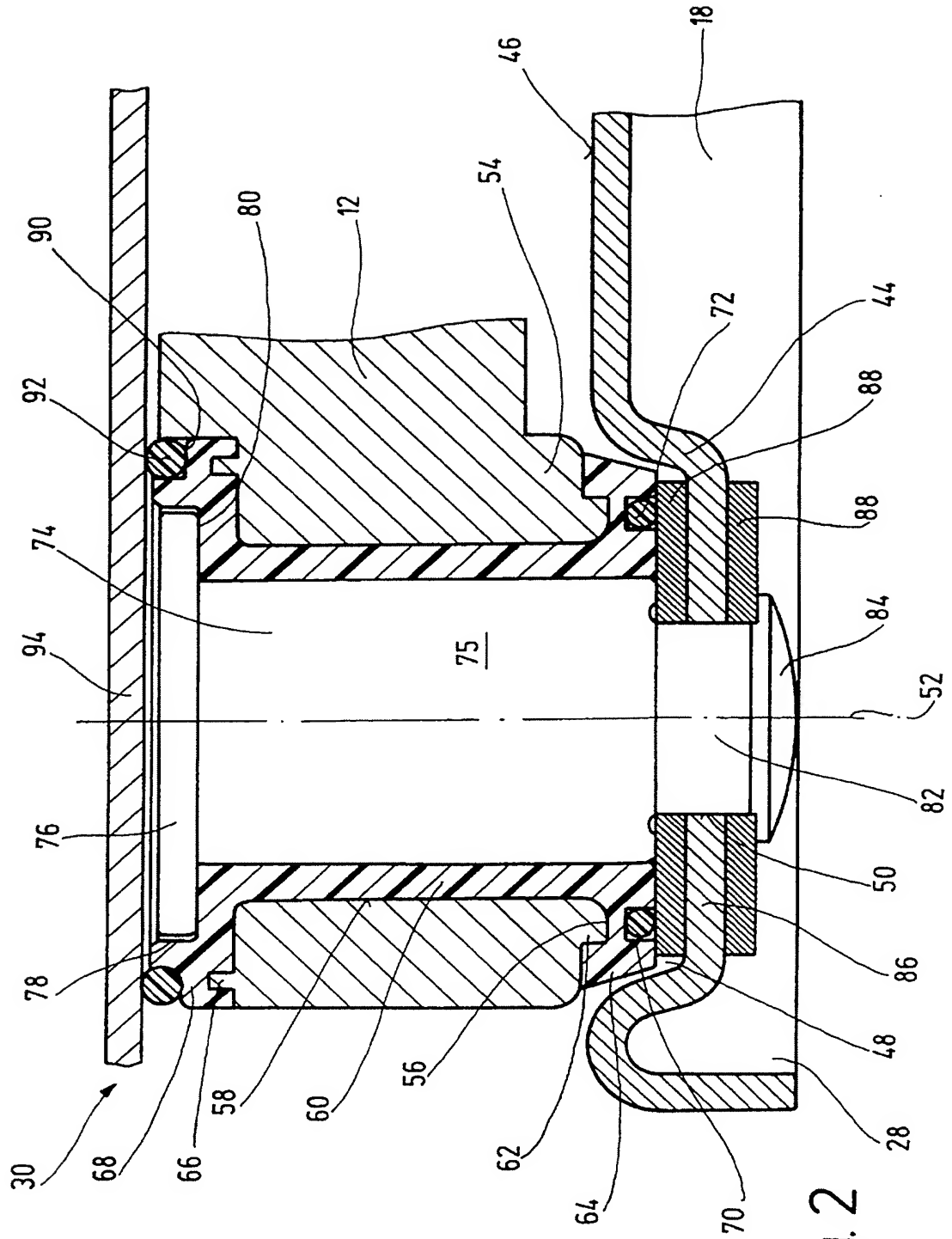


Fig. 2

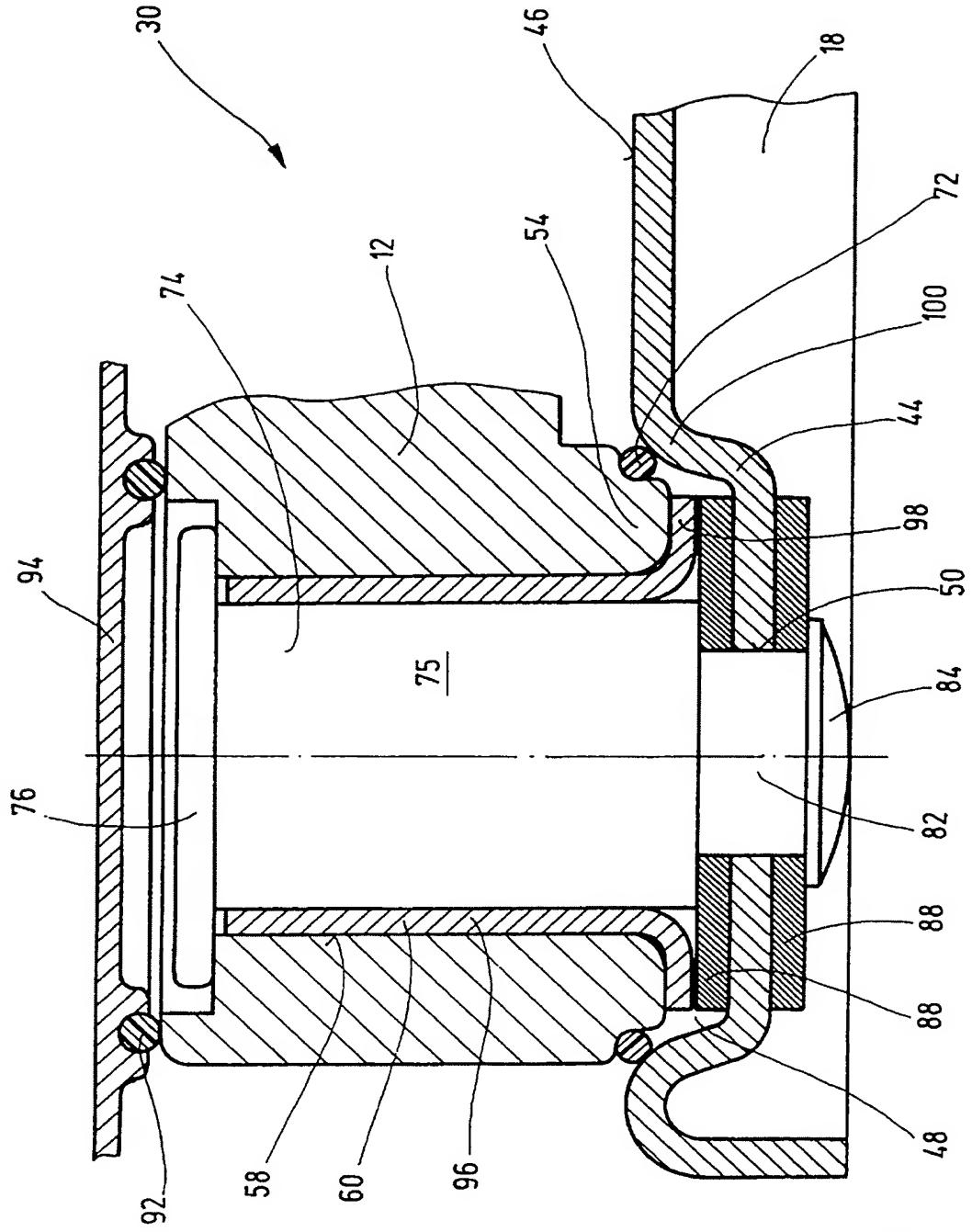


Fig. 3

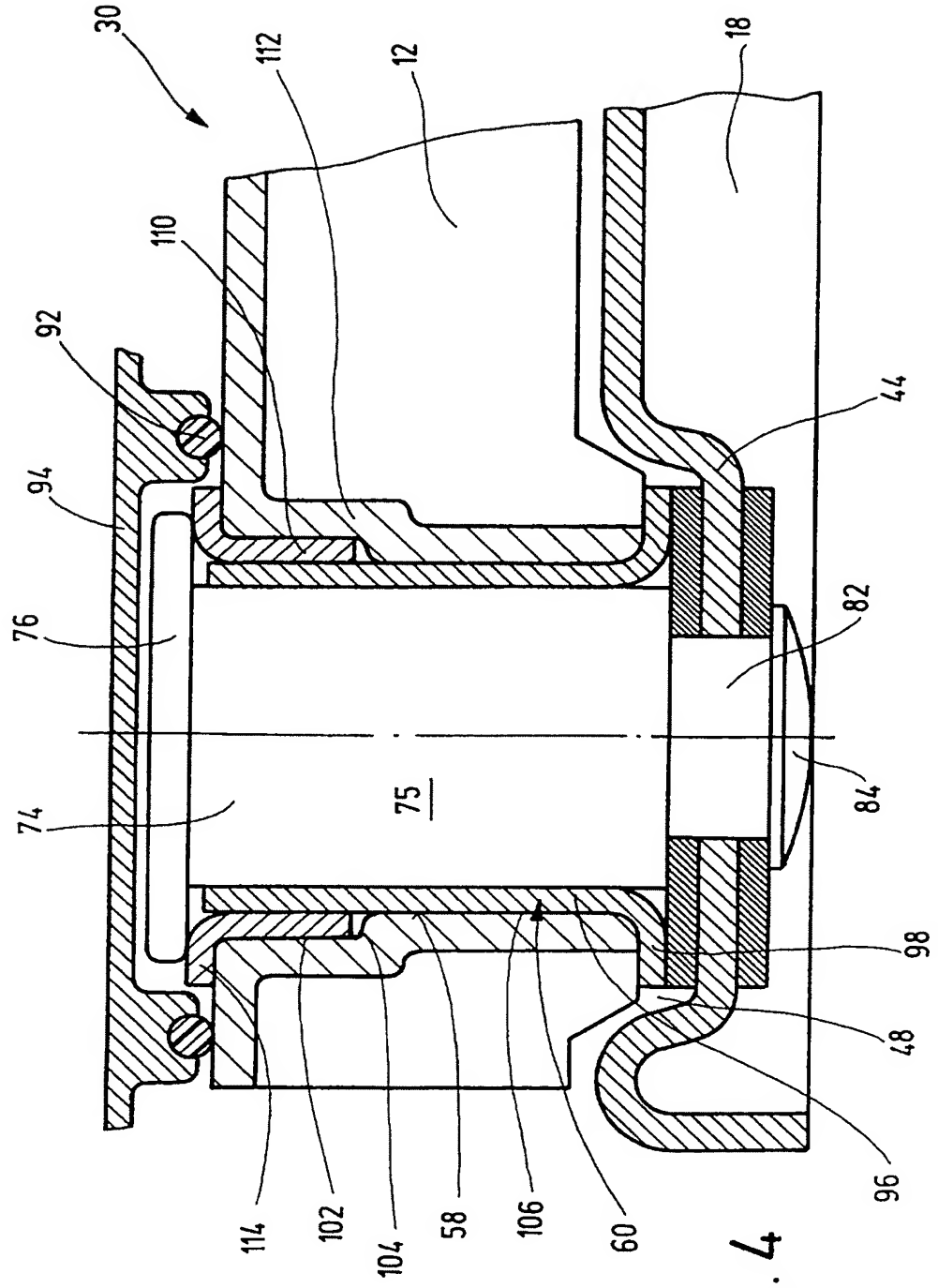


Fig. 4

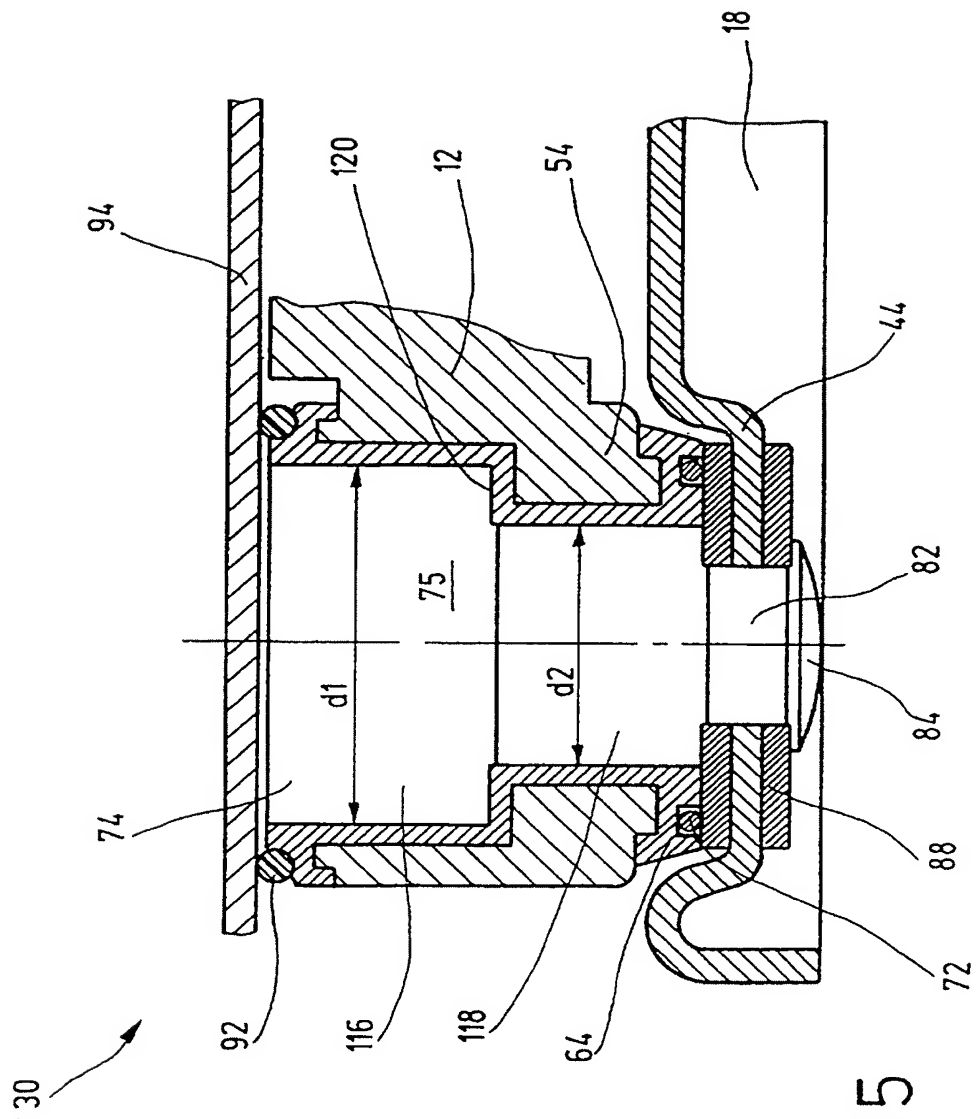


Fig. 5

Fig. 6a

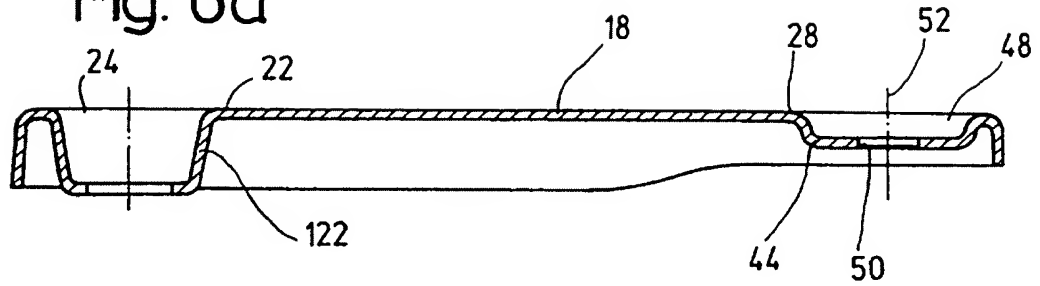


Fig. 6b

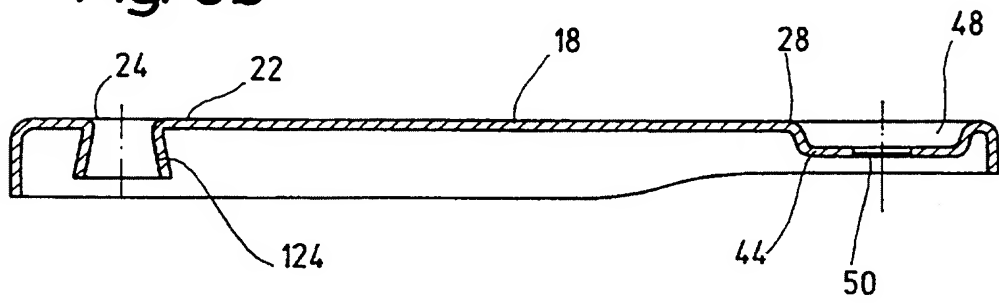
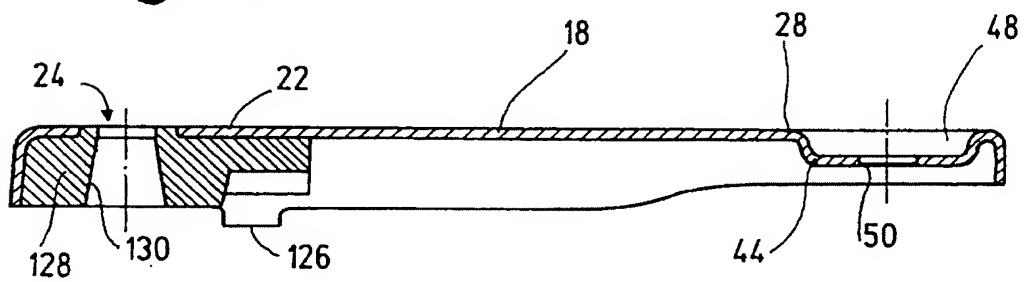


Fig. 6c



WIPER DEVICE

The present invention relates to a wiper device, especially for the wiping of panes of motor vehicles.

A known form of wiper device comprises a coupling element which carries a wiper arm and a wiping blade fastened thereto. The coupling element is connected with a drive element and a control element to be movable rotationally. The drive element and the control element have the form of levers which are respectively connected with a drive shaft and a control shaft in each case secure against rotation relative thereto and with the coupling element by way of a bearing to be movable rotationally relative to the coupling element. The coupling element and the drive element or the control element are arranged to lie one above the other in the bearing region and are connected together by means of a pin. The pin is guided through a bearing bush which is arranged in a corresponding passage opening of the coupling element. It is a disadvantage of the known wiper device that the overall axial bearing length is determined by the height of the coupling element. Since only a restricted installation space is available in a motor vehicle and the coupling element, for reasons of weight, cannot be constructed as strongly as desired, only a very limited axial bearing length is possible. As a result, due to a relatively high bearing load during use of the wiper device a deflection of the bearings can arise so that tilting play and axial play of the bearings increase to an unacceptable extent. Moreover, the production cost of the bearings is relatively high, since the bearing bushes must be cast into the drive elements or control elements, which are as a rule diecast parts.

According to the present invention there is provided a wiper device comprising a coupling element, which carries a wiper arm, and a drive element and a control element to impart reciprocating pivotal movement to the coupling element, each of the drive element and the control element being pivotably connected to the coupling element by way of a respective bearing and each being provided in the region of the associated bearing with a recess in which the bearing is at least partially engaged.

A wiper device embodying the invention may offer the advantage that a substantial axial bearing length can be achieved by means of a simple form of construction. Due to the drive element and the control element each having, in the region of the bearing, a respective shaping out into which the coupling element engages at least partially, the axial

bearing length can be increased without the overall height of the wiper device being increased. Due to the greater axial length, an improved guidance is achieved, which permits an optimum introduction of force into the bearing. This results in a smaller specific bearing load, so that wear of the bearing is reduced. The bearing no longer has a tendency to deflect, so that tilting play and axial play are substantially avoided, which appreciably extends the overall service life of the bearing and thus the entire wiper device. Moreover, the bearing can due to the greater axial bearing length absorb a greater force, so that the wiper device can be designed for a greater acceleration or a greater stroke. Consequently, the wiper properties, in particular the wiped area able to be covered by the wiper device, can be improved or increased.

Preferably, the coupling element in the region of each bearing has an enlarged portion, which engages partially into the associated recess and is penetrated by a passage serving for the reception of a bearing bush. The bush can be formed by a synthetic material part injection-moulded into the passage.

For preference, each bush comprises a collar which engages over the respective enlarged portion and projects at least partially into the associated recess and serves for the prolongation of the effective axial length of the bearing. The collar can have an annular groove, which is open in axial direction, for the reception of sealing means.

Each bush preferably receives a bearing pin, which at one end bears by a flange against an annular step of the bush and at the other end engages by a prolongation through an opening in the associated recess and there forms a head serving for captive fixing of the pin. The pin expediently comprises a basic body or shank, the axial length of which determines the effective length of the bearing. Such a body can have at least two portions of different diameter, wherein a portion of greater diameter serves to support the pin. For preference, a shoulder of each recess forms a sealing seat for the sealing of the associated bearing.

The drive element and the control element can each be a respective shaped sheet metal part, whilst the coupling element can be a diecast part or a shaped sheet metal part.

Embodiments of the present invention will now be more particularly described by way of example with reference to the accompanying drawings, in which:

- Fig. 1 is a schematic overall view of a wiper device;
- Fig. 2 is a sectional view of a bearing region of a first wiper device, of the kind shown in Fig. 1, embodying the invention;
- Fig. 3 is a sectional view of a bearing region of a second wiper device, of the kind shown in Fig. 1, embodying the invention;
- Fig. 4 is a sectional view of a bearing region of a third wiper device, of the kind shown in Fig. 1, embodying the invention;
- Fig. 5 is a sectional view of a bearing region of a fourth wiper device, of the kind shown in Fig. 1, embodying the invention

Figs. 6a to 6c are sectional views of different forms of drive elements in the wiper device of Fig. 1.

Referring now to the drawings there is shown in Fig. 1 a schematic illustration of a wiper device 10; in the following description, reference is made only to parts essential for the explanation of the invention so that the detailed construction is not discussed more closely. The wiper device 10 comprises a coupling element 12, which carries a wiper arm 14. The wiper arm 14 is in known manner articulated at the coupling element 12 to be tiltable and can be urged by means of a tension spring 16 under bias against a pane (not illustrated) of a motor vehicle. The coupling element 12 is associated with a drive element 18 and a control element 20. The drive element 18 has at one end 22 a receptacle 24 for a drive shaft 26, which is fixed to the vehicle body. The drive element 18 is connected at its other end 28 with the coupling element 12 by way of a bearing 30 so as to be movable rotationally. The actual construction of the bearing 30 is discussed in detail by reference to the following figures.

A receptacle 34 for a control shaft 36 is arranged at the one end 32 of the control element 20. The control shaft 36 is also fixed to the vehicle body. At its other end 38, the control element 20 is connected with the coupling element 12 by way of a bearing 40 so as to be

movable rotationally. The construction of the bearing 40 corresponds with that of the bearing 30 and is explained still more closely by reference to the following figures.

In use of the wiper device 10 shown in Fig 1, the drive shaft 26 is set into a reversing rotational movement by way of a drive, which is not illustrated. The reciprocating rotational movement takes place, as indicated by arrow 42, in and counter to clockwise sense through an angle of about 120° . Due to the rotational movement of the drive shaft 26, the drive element 18, which is connected with the drive shaft 26 in its receptacle 24 to be secure against relative rotation, is equally set into a reciprocating rotational movement. Consequently, the coupling element 12 and the wiper arm 14 fastened thereto experience a pivotal stroke movement which is determined by the control element 20. In correspondence with the cam course of the control element 20, the rotational movement of the drive element 18 is translated into the pivotal stroke movement. The function is not to be entered into in detail in the following description, but it is clear that the drive element 18 and the control element 20 are connected with the coupling element 12 by way of respective bearings 30 and 40.

Different forms of the bearings 30 and 40 are shown in Figs. 2 to 5. The representation in each of these figures is along the Fig. 1 section line C-C through the bearing 30. Since the construction of the bearings 30 and 40 is identical, the explanations in respect of the bearing 30 are also applicable to the bearing 40.

The sectional illustration in Fig. 2 shows part of the coupling element 12 and part of the drive element 18. The drive element 18 is a shaped sheet metal part, the manufacture of which can take place by means of known working methods, for example a punching, a bending or an internal high-pressure process. The drive element 18 at its end 28 has a pot-shaped shaping-out or recess 44, which is directed into the drive element 18 so that, from the view of an upper edge 46, a depression 48 into the drive element 18 results. The depression 48 as seen in plan view is preferably circular. The recess 44 has an opening 50 in the centre of the depression 48. The opening 50 is preferably a bore with a centre line 52.

The coupling element 12 has a portion 54, which is thickened in terms of material, in the region of the bearing 30. The coupling element 12 is, for example, a diecast part (aluminium diecasting) so that the shape structure resulting from the thickened portion 54

can be taken into consideration in simple manner during manufacture of the coupling element 12. The thickened part 54 has an outline substantially matched to the depression 48 so that a lower termination 56 of the thickened portion 54 engages at least partially into the depression 48. A passage 58, which is preferably formed to be circular, is provided in the coupling element 12 in the region of the thickened portion 54. A bearing bush 60 is arranged within the passage 58. In the embodiment shown in Fig. 2, the bush 60 consists of a synthetic or plastics material part injection-moulded into the passage 58. The injection-moulding of the bush 60 can be carried out by a generally known method of injection moulding. For example, the core of an injection-moulding tool can be introduced into the passage 58 so as to leave a gap, which is filled up with plasticised synthetic material, between the core and the wall of the passage 58. After setting of the synthetic material, the core is extracted, whilst the synthetic material bush 60 thus removed from the mould remains in the passage. The bearing bush 60 and the thickened portion 54 have certain features of shape, which are not taken into consideration more closely, with respect to the injection-moulding operation explained above. Thus, the thickened portion 54 has an annular shoulder 62 at its side facing the drive element 18. The annular shoulder 62 is engaged around in hook shape by a collar 64 of the bush 60, so that a mechanically positive connection arises between the bush 60 and the portion 54 of the coupling element 12. Thereby, and in conjunction with a further annular shoulder 66, which is present on the side of the coupling element 12 remote from the drive element 18, of the portion 54 and a collar 68 of the bush 60, an axial arresting of the bush 60 is achieved. At the same time, securing against relative rotation can be achieved through appropriate projections which are not illustrated in Fig. 2 and which engage into corresponding recesses of the coupling element 12.

The collar 64 has an annular groove 70 serving for reception of a sealing means 72. Due to the collars 64 and 68, the axial extent of the bearing bush 60 is prolonged relative to the axial extent of the passage 58. The collar 64 in this case extends into the depression 48 of the drive element 18.

The assembly of the bearing is effected by means of a pin 74, which has a cylindrical basic body or shank 75. The centre line of the pin 74 coincides with the centre line 52 of the passage opening 50. A plate-shaped flange 76, which is engaged in an annular step 78 of the bush 60, is formed on the shank 75 of the pin 74 and bears against a radially extending annular surface 80 of the bush 60. The axial length of the shank 75

corresponds with the axial extent of the bush 60. The shank 75 passes over into a spigot-shaped extension 82, which extends through the opening 50 of the drive element 18. The axial length of the extension 82 is chosen so that a head 84 thereof projects beyond a base 86 of the recess 44 to such an extent that, even with the interposition of adjusting washers or underlay washers 88, the head 84 can provide mechanical arresting of the pin 74. For this purpose, the head 84 is, for example, plastically deformed. A further possibility, which is not illustrated, consists in providing the head 84 with an axially effective locking device, for example a split pin or the like.

The collar 68 of the bush 60 furthermore forms an annular shoulder 90, which is open radially outwards and suitable for the reception of sealing means 92. The bearing 30 is covered by a cap 94, which extends over the entire coupling element 12 so that the bearing 40 is covered in analogous manner.

Due to the construction of the bearing 30 as shown in Fig. 2, the effective axial bearing length extends beyond the thickness or depth of the coupling element 12. This is achieved by the thickened portion 54, the bearing bush 60 and the recess 44, so that the bearing 30 extends into the depression 48. Thus, for the same external dimensions, i.e. from the lower edge of the drive element 18 to the upper edge of the cap 94, a significant prolongation of the effective bearing length is achieved by comparison with the prior art. By reason of the greater bearing length, an increased bearing area, which is formed by the contact area, namely the envelope area of the shank 75 and the envelope area of the bearing bush 60, is available. Thus, an optimum introduction of force into the bearing 30 is possible without risk of overload of the bearing 30. Moreover, the risk of tilting of the pin 74 is reduced due to the increased length of the bearing 30. Since the coupling element 12 and the wiper arm 14 fastened thereto have a substantial length as seen in relation to the overall length of the pin 74, an appreciable absorption of force must be undertaken by the bearing 30 or 40 due to lever effect. As a result of the structuring of the bearing 30, this is optimised for the same external dimensions, so that the wiper device 10 with the bearing 30 or 40 can be loaded by a greater force. This can be utilised for, for example, an improved pivotal stroke movement.

The sealing means 72 and 92 serve for sealing of the bearing 30 against external contamination, for example rainwater. Due to the construction of the bearing bush 60 from synthetic material, an improved corrosion resistance of the entire bearing 30 or 40 is given.

In Fig. 3, the bearing 30 is shown in a further form, whilst the basic construction and function are maintained. Parts which agree with those in Fig. 2 are provided with the same reference numerals and are not explained again.

By comparison with the bearings illustrated in Fig. 2, the bearing bush 60 is a metal bush which is inserted into the passage 58 of the thickened portion 54 of the coupling element 12. The bush 60 is here formed as hollow cylinder 96 consisting of a metallic material, for example brass. The cylinder 96 at its end facing the drive element 18 has a collar 98, which is shaped to extend radially outwards and engages over the thickened portion 54. Arresting of the cylinder 96 is effected by means of the underlay washer 88 which, when the pin 74 is arrested, firmly clamps the cylinder 96 in the passage 58. The bearing bush 60 of Fig. 3 is thus fixed axially and secure against rotation. In correspondence with the axial length of the cylinder 96, which extends at least partially into the depression 48 of the drive element 18, there similarly results a relatively substantial effective axial length of the bearing 30.

An advantage of the variant shown in Fig. 3 is that a shoulder 100 of the recess 44 serves as a sealing seat for the sealing means 72.

In the case of the variant shown in Fig. 3, the coupling element 12 is again a shaped sheet metal part and has a passage 58, which is formed in stepped manner. The passage 58 changes from a portion 102 of greater diameter by way of a step 104 to a portion 106 of smaller diameter. The bearing bush 60 is formed by the hollow cylinder 96 as shown in Fig. 3 and by a further hollow cylinder 110. The cylinder 96 is in this case inserted into the portion 106 of smaller diameter. The annular space, which is formed by the step 104 and the portion 102 of greater diameter of the passage opening 58, is filled out by the cylinder 100, so that a mechanically positive connection arises between a wall 112 of the coupling element 12 and the shank 75, which is guided in the cylinder 96, of the pin 74. The cylinder 110 forms a collar 114 extending radially outwards. The collar 114 lies against the coupling element 12 and serves for the support of the flange 76 of the pin 74.

In the case of the bearing shown in Fig. 4, the drive element 18 and the control element 20 (Fig. 1) as well as the coupling element 12 can be formed as shaped sheet metal parts. Thus, the manufacture of these parts becomes possible in simple manner by means of

simple bending or punching processes. At the same time, a reduction in weight is achieved. In addition, a significant rigidity and fatigue strength of the entire wiper device 10 is conferred by the relatively great axial length of the bearing 30 or 40.

Fig. 5 shows a further variant of the bearing 30 or 40, for which purpose the previous explanations concerning Fig. 2 are referred to again. In this variant, the bearing bush 60 is again formed as an injection-moulded synthetic material part. A feature of the variant shown in Fig. 5 is that the shank 75 of the pin 74 comprises a portion 116 of a greater diameter d_1 and a portion 118 of a smaller diameter d_2 . The portions 116 and 118 pass over into each other by way of a radially extending annular surface 120. According to the geometry of the pin 74, the passage 58 of the coupling element 12 and the bearing bush 60 are appropriately adapted.

By virtue of the structure of the pin 74 shown in Fig. 5, the available axial length of the bearing 30 is increased. The overall height, which is otherwise needed by the flange 76 (Fig. 2), of the pin 74 is here utilised for the effective bearing length. The support of the pin 74 takes place by means of the annular surface 120. Due to the greater axial length of the bearing 30, a greater bearing area is available, which is determined by the circumferential area of the shank 76 of the pin 74.

Different possibilities of structure of the receptacles 24 and 34, respectively, of the drive element 18 and the control element 20 are shown for the sake of completeness in Figs. 6a to 6c. A drive element 18, which at its end 28 has the recess 44, is shown in each of Figs. 6a to 6c. According to Fig. 6a, the receptacle 24 for the drive shaft 26 is formed as conical, knurled pot 122. According to Fig. 6b, the receptacle 24 consists of a deep-drawn cone 124. Fig. 6c shows a form in which the end 22 of the drive element 18 has limbs 126, which serve for the fixing of an insert part 128. The insert part 128 can consist of, for example, a diecast part. The insert part 128 in this case has a cone 130, which forms the receptacle 24 for the drive shaft 26.

CLAIMS

1. A wiper device comprising a coupling element, which carries a wiper arm, and a drive element and a control element to impart reciprocating pivotal movement to the coupling element, each of the drive element and the control element being pivotably connected to the coupling element by way of a respective bearing and each being provided in the region of the associated bearing with a recess in which the bearing is at least partially engaged.
2. A wiper device as claimed in claim 1, wherein the coupling element is provided in the region of each bearing with an enlarged portion in the region of each bearing with an enlarged portion which is engaged at least partially in the associated recess and with a passage which extends through the enlarged portion and receives a bearing bush.
3. A wiper device as claimed in claim 2, wherein each bush is formed by direct injection moulding of synthetic material in the associated passage.
4. A wiper device as claimed in claim 2 or claim 3, wherein each bush has a collar engaging over the associated enlarged portion of the coupling element and projecting at least partially into the associated recess thereby to extend the effective axial length of the respective bearing.
5. A wiper device as claimed in claim 4, wherein the collar has an annular groove which is open in the axial direction of the collar and serves for reception of sealing means.
6. A wiper device as claimed in any one of claims 2 to 5, wherein each bush receives a bearing pin provided with a flange bearing against an annular step of the bush and with a shank extension extending through an opening in the associated recess and terminating in a head serving to captively fix the pin.
7. A wiper device as claimed in claim 6, wherein each pin has a shank defining the effective axial length of the respective bearing.

8. A wiper device as claimed in claim 7, wherein the shank of each pin has at least two portions of respectively different diameter, a larger diameter one of the portions serving to support the pin.
9. A wiper device as claimed in any one of the preceding claims, wherein each recess has a shoulder forming a sealing seat for the associated bearing.
10. A wiper device as claimed in any one of the preceding claims, wherein each of the drive element and control element is formed from shaped sheet metal.
11. A wiper device as claimed in any one of the preceding claims, wherein the coupling element is a diecast component.
12. A wiper device as claimed in any one of claims 1 to 10, wherein the coupling element is formed from shaped sheet metal.
13. A wiper device substantially as hereinbefore described with reference to Fig. 1 and any one of Figs. 2 to 5 of the accompanying drawings.



**Patent
Office**

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Application No: GB 9720355.8
Claims searched: 1-13

Examiner: John Fulcher
Date of search: 25 November 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): A4F(FADA,FADB,FADC)

Int Cl (Ed.6): B60S 1/24,1/28,1/34

Other: Online:- WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	EP 0537059 A1 (JOURNEE) -see figs	1 at least
X	WO 96/22204 A1 (ITT) see figs, especially fig 4	1 at least
X	WO 96/11824 A1 (ITT) -see figs	1 at least
A	US 4843898 A (ISHIKAWA) -see figs	1 at least
A	US 4683605 A (LEROY ET AL) -see figs	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.